The bridge to possible

How universities are solving some of industry's greatest challenges

Australian higher education study tour May 2022

Reflections on the tour

The 2022 Cisco Higher Education Study Tour provided a chance for universities across Australia to regroup and reflect on an incredibly demanding two years.

The sector has experienced fiscal challenges, disruption and uncertainty as a result of the global pandemic, but it has also demonstrated that it can reinvent itself and thrive. The importance of deep partnerships between industry and universities has come into sharper focus, and the depth and breadth of cooperation has started to change. Australian universities are outstanding in knowledge creation, ranking 9th out of 31 OECD countries, but only 1.6 per cent of innovating businesses in Australia collaborate with our world-class university research.[1] The best industry-university partnerships are based on mutual dependence – not just mutual interest. Companies like Cisco know that they can't respond quickly enough to market changes without trusted university partners. This includes universities that can help them co-develop and deliver curriculum for emerging skills, create test environments for its technology or provide the expertise needed for applied research. University partners such as La Trobe, Flinders and the University of Adelaide are increasingly lending their own digital infrastructure as Living Labs for industry partners to trial.

The flip side is also true, with universities realising that industry partnerships bring enormous value. This includes making teaching and courses more current and relevant, increasing the impact from research and attracting much-needed funding leverage that allows universities to tackle problems at scale. Cisco's best university partnerships are measured by the scale and impact of our joint activities, not just the use of our logos on marketing material or in presentations.

The study tour focused on the positive impacts of industry-university partnerships, including:

- **Opportunities presented by digital innovation on university campuses:** We visited universities who prioritised investment in digital to improve the student experience, drive efficiencies and create new revenue streams
- **Addressing some of the most compelling challenges of our time through collaborative activity:** The pandemic has reinforced the fact that partnerships between universities, industry and government are required to solve Australia's major economic and environmental challenges
- **Jointly preparing for and capitalising on areas of high jobs growth:** Giving universities early insights into emerging areas of demand in the digital and Net Zero economies.

The study tour visited RMIT University, La Trobe University, the University of Adelaide and Flinders University, interspersed with visits to Cisco, Adelaide Oval, Lot Fourteen in Adelaide and the Tonsley Innovation District. Attendees spent three days seeing and hearing about practical steps being taken in the sector to embrace digital technologies to create impact for students and industry. Many of the projects and activities we saw on the study tour have been supported through Cisco's Country Digital Acceleration (CDA) program. Through CDA, Cisco is investing in pivotal projects alongside government, industry, academia and community organisations. The aspiration for CDA is to contribute to national economic growth and create new jobs by fast tracking Australia's adoption and development of digital technologies.

Reg Johnson, Director,
Strategic Industries, Cisco Australia

Participants in the study tour

UNSW SYDNEY · QUT Queensland University of Technology · UNIVERSITY OF CANBERRA · Griffith UNIVERSITY · VICTORIA UNIVERSITY MELBOURNE AUSTRALIA · LA TROBE UNIVERSITY · ECU · THE UNIVERSITY of ADELAIDE · DEAKIN UNIVERSITY

Site visits

RMIT UNIVERSITY · LA TROBE UNIVERSITY · Flinders UNIVERSITY · THE UNIVERSITY of ADELAIDE · LOT FOURTEEN · AUSTRALIAN Cyber Collaboration Centre · Tonsley Innovation District

The bridge to possible

The National Industry Innovation Network (NIIN)

The National Industry Innovation Network (NIIN) is demonstrating that industry-university partnerships are stronger and more important now than ever. NIIN is working on nationally significant projects, including securing critical infrastructure, education, digital health and hybrid work through a range of initiatives. The NIIN's mission allows partners to pursue projects across a broad range of areas of national importance. The greater the national impact, the more on-point the project.

Major NIIN priorities

The NIIN focuses on addressing some of the most critical challenges facing the Australian economy, including:

- 1. Smart Zero
- 2. Hybrid work
- 3. Securing critical infrastructure
- 4. Digital precints & regions
- 5. Digital transformation

1. Smart Zero: Using Digital Technologies to Accelerate Progress to Net Zero

Why it matters

The scale and depth of the environmental threat posed by greenhouse gas emissions is widely accepted. Globally, governments have highlighted the need for urgent action, but the translation of targets into outcomes will require increased efforts across many sectors. The higher education sector has a major role to play in the journey to Net Zero – both in terms of reducing its own environmental footprint and pioneering new climate technologies through applied research.

Major themes from the study tour

- **Industry demand for Net Zero solutions is growing:** Companies in all industry sectors, including higher education, are setting targets for Net Zero and moving into implementation mode. Some companies (e.g. BHP) are going further and requiring companies in their supply chain to also achieve Net Zero status.
- **The convergence of digital and Net Zero is a new frontier for innovation:** Demand is building for new solutions to the climate change challenge. The role of digital in reducing or avoiding emissions has been largely ignored or unknown. The convergence of digital and Net Zero requires applied research capability, new skills and collaboration.
- **Universities are exploring this convergence on their own campuses:** New methods to optimise energy usage across campuses – powered by networks of low-cost sensors and machine learning algorithms – are enabling universities to reduce their environmental footprint while realising significant cost savings.
- **Smart Zero skills are a major growth area for universities to tap into:** Modelling suggests Australia's transition to Net Zero could create 672,000 new jobs across the economy[2] including climate modelling, digital technology, battery storage, heating and cooling, hydrogen, carbon capture and storage (CCS), climate resilience and land use.

What we've heard

"Solving problems at the intersection of digital and Net Zero will require collaborative action from government, universities and the private sector to harness Australia's collective research capability."

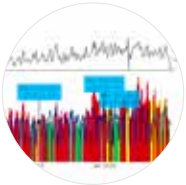
- Dr Alan Finkel AC

"Advanced networks will underpin efforts to reach Net Zero. Given the sheer data involved, and sensors that will be connected, to reduce emissions it won't be possible to achieve Smart Zero without automated, intuitive and software-defined networks."

- Carl Solder, Chief Technology Officer, Cisco Australia

NIIN publications

Snapshot



LA TROBE UNIVERSITY

La Trobe Energy Analytics Platform: Automating energy usage across the campus

La Trobe Energy Analytics Platform (LEAP) is a technology platform that monitors consumption patterns and performance across La Trobe University's vast network campuses. The platform generates data insights that can help to reduce energy consumption by making lighting, heating and cooling adjustments in real time. LEAP is built on top of 1 billion datapoints and is already delivering significant value. For example, La Trobe was able to receive a $225,000 energy rebate by forecasting lower-than-planned energy usage. The technology is expected to help La Trobe reach its Net Zero emissions targets by 2029.

LA TROBE UNIVERSITY

La Trobe University CO2 Air Quality Proof-of-Concept Trial: Looking after the health and wellbeing of student and staff in the post-COVID university environment

La Trobe University is conducting a C02 Air Quality proof of concept trial at its Bundoora campus. The trial focuses on using CO2 sensors to send real-time CO2 level information to inform students and staff of the air quality. WiFi data is also captured and correlated with the CO2 data in an effort to develop a Machine Learning-based correlation model so that WiFi data can be used as surrogate of CO2 data.

2. Hybrid Working: The Blurring of Lines between Physical and Digital

Why it matters

The global pandemic has transformed the way we work and learn. What started as a forced move to remote working and learning has become something much more fundamental and transformative. Embracing hybrid learning and working (in a range of settings) creates advantages for both institutions (efficiencies, retention of talent and access to a broader pool of workers) and learners / workers (improved engagement and flexibility).

Major themes from the study tour

- **The pandemic accelerated digital technologies, including hybrid working and learning by four years[3]:** As remote work and learning became necessary, the innovation cycles on collaboration technology contracted, along with the capacity for universities to manage change.
- **The initial response to the pandemic was to create workarounds; now we are seeing fundamental change**: The focus has shifted from simple video conferencing to creating equity of presence (whether you are in the room or remote) and smart spaces that use sensors and data to effectively and safely manage the return to work.
- **Hybrid learning and working will force campuses to be designed to be more experiential and alive:** In a hybrid environment, people need a reason to participate in person. Universities will need to curate the student (and staff) experience to attract people to campus.

What we've heard

"We're not going to wake up in 5 years and suddenly be in a hybrid work world. It's a journey, one in which we need to make investments in now to prepare for the future."

- Chris Anderson, Head of Workplace Technology, Cisco ANZ

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Snapshot

LA TROBE UNIVERSITY

Virtual Emergency Department: A collaboration between La Trobe University and Northern Health
The pandemic created major challenges for emergency health departments in managing COVID-positive patients presenting for emergency treatments. Northern Health, in partnership with La Trobe University, developed a trial to create a virtual emergency department where patients, allied health workers and other clinicians could access emergency triage services via video. The trial has been expanded to accommodate a broad range of patients, not just those who are (or suspected to be) COVID-positive. Early results suggest the approach could reduce presentations, and in some cases actually encourage people to present who might not otherwise have done.

VICTORIA UNIVERSITY
MELBOURNE AUSTRALIA

Victoria University Safe Return to Campus: Making the campus safe for work and study
Victoria University is conducting a Safe Return to Campus proof of concept at its Footscray campus. The trial focuses on using sensors (WiFi, Webex and Meraki cameras) to send real-time information to those using facilities about environmental conditions and density. Equipment can be programmed in line with dynamic conditions; for example, if room density limits are reduced a message can be sent through smart signage alerting people in the room that limits are being exceeded.

3. Securing Critical Infrastructure: The Network as the First Line of Defence

Why it matters

Australian organisations have become a global target for cyber attacks from nation states, state-sponsored actors and transnational cybercrime syndicates. The frequency, scale and severity of attacks are intensifying, as is the sophistication and resourcing of attackers. The pandemic contributed to the 13% reported annual increase in attacks. Approximately a quarter of all cyber incidents reported to the Australian Cyber Security Centre during the 2020-21 reporting period were associated with Australia's critical infrastructure or essential services.[4] This means an essential service or critical infrastructure was attacked every 32 minutes. Successful attacks on critical infrastructure assets likely cost the Australian economy billions of dollars, including from loss of business continuity.

Major themes from the study tour

- **The data network is the first line of defence against cyber aggressors:** Identity and networks are the foundations of digital trust and the core technology platform for sustained cyber resilience. Networks connect and manage computing devices (such as laptops, desktops, servers, smartphones and tablets) and an expanding array of industrial Internet of Things devices that communicate with one another.
- **Encrypted data presents new challenges:** Cyber attackers are becoming increasingly sophisticated in the use of encryption to disguise or hide threats. Basic networks aren't capable of performing detailed analysis of encrypted traffic, including analysis of the origin of the traffic (where the security certificate was issued) and its likely legitimacy.
- **Projected skills shortages in cyber security create another vulnerability:** Australia faces a major cyber security skills shortage across a spectrum of cyber security roles, ranging from specialist engineers to blue tech (technology-intensive jobs that do not require a degree). Industry has a vital role to play in partnership with universities to forecast and respond to potential shortages.
- **Universities need to treat the network as the first and most powerful line of defence:** The network can deliver essential ingredients for a cyber security response, but this requires continuous investment. The network – like buildings and facilities – needs to be managed based on its lifecycle. Upgrades and maintenance are needed to improve functionality and performance, including: continuously improving visibility and early warnings / detection, adding / strengthening control points capable of defending assets across the organisation, and driving operational efficiency through automation.

Why this sector is a cyber security target

- Holds significant high performance computing resources
- Major export industry
- Underpins the nation's innovative capacity through sovereign research capability
- A leading partner and host of international collaborative research
- Links to national security
- Ingests data from industry and government which must be protected

Specific challenges

1. Universities have large and diverse user bases including staff, students and suppliers that need access to the university network
2. Scale, complexity, capability and threat landscape are different from university to university – resulting in the absence of a consistent sectoral cyber policy and approach
3. The volume of unmanaged and personal devices connecting to university networks (both on and off the campus) is growing, increasing attack surfaces
4. Unlike staff or contractors, students accessing the network are – for all practical purposes – unable to be vetted for any nefarious intent
5. Mass connectivity and sensor-driven digital campuses – enabled by next-generation technologies such as 5G – will continually enlarge the attack surface

What we've heard

"Cyber resilience has become one of Australia's greatest challenges and is critical to the nation's economic prosperity and security. Australia is the most attacked country in the world per capita from a cyber security perspective and needs to be particularly vigilant. This particularly applies to the nation's critical infrastructure assets which are a target for potential attackers. These assets include utilities, healthcare systems, supply chains, defence industries and a range of other systems that are fundamental to Australia."

- Mike Barber, CEO, A3C

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Australian Cyber Collaboration Centre

Australian Cyber Collaboration Centre: A world-class cyber ecosystem
The Australian Cyber Collaboration Centre (A3C) assists businesses to understand and navigate the cyber ecosystem. A3C is a central connection point for businesses looking to improve their cyber resilience and is rapidly becoming an influential and trusted voice in Australia's cyber community.

A3C includes a world-class Cyber Range where organisations can carry out advanced cyber security training, exercises and testing of equipment or network configurations in the knowledge that their production networks are safe from interference. The range is resourced with tools and A3C's members complement existing capabilities in SMEs – providing opportunities for cyber startups, local cyber service providers and global cyber companies to showcase their capabilities and tools together and to the fullest extent.

VICTORIA UNIVERSITY
MELBOURNE AUSTRALIA

Victoria University Polytechnic's Cyber Security Training Centre: Cyber training centre in Melbourne's west
Victoria University Polytechnic, in partnership with Cisco and underpinned by Optus services, opened its Cyber Security Training Centre in Melbourne's west. The centre is a response to the 18,000 additional cyber security workers who will be required by 2026. The facility is designed to feel like an industry-standard security operations centre (SOC) to help students imagine themselves in the cyber security workplace. Learning spaces are equipped with leading-edge technology from Cisco, including immersive Webex Boards that allow students to seamlessly interact with industry and other experts.

4. Smart Precincts & Regions: Role of Digital and Industry Collaboration to Grow Economies

Why it matters

Precincts drive economic growth and improve liveability. There is global interest by governments, businesses and research institutions in developing and fostering precincts. Precincts are places of purpose and strong vision, underpinned by innovative application of technology. These precincts can be both industry and citizen-focused. Successful precincts make a significant contribution to the economy and are more resilient to economic downturns. The clustering of industries in digitally advanced precincts facilitates collaboration, knowledge flow and knowledge spill over between industry, researchers and entrepreneurs, which plays a critical role in increased innovation, particularly for new ventures.

Major themes from the study tour

- **It is not sufficient for precincts to exist; they need to be digitised and create collaboration at the data layer:** The data network is the point at which all technologies coalesce, including sensors deployed across precinct infrastructure and the multitude of applications running on the cloud. It is through collaboration at the data layer that teams can experiment and innovate at scale.
- **Universities are critical anchors to economic precincts:** Universities provide a clear home for applied research activity and serve as intermediaries that can host and connect talent from inside and outside the precinct, including researchers, students, startups and global companies.
- **Precincts need to be programmed and activated:** 'Build it and they will come' does not work. The most effective precincts draw industry to them and have porous boundaries rather than impenetrable perimeters.
- **Precincts benefit from triple-helix collaboration:** Collaboration between industry, universities and government accelerates knowledge spill over and ensures that all levers are being applied to innovation challenges. La Trobe University in particular demonstrated that the best partnerships are multi-faceted, and build on trust and mutual need. The La Trobe partnership extends into teaching, research and campus operations and is underpinned by jointly funded resources and mechanisms that ensure innovation activity is repeatable and scalable (the Digital Innovation Hub).

What we've heard

"Innovation districts make a significant contribution to the economy. The clustering of industries in innovation precincts, districts and neighbourhoods facilitates collaboration and knowledge spill over between industry, researchers and entrepreneurs. This plays a key role in driving innovation and makes a significant contribution to economic growth."

- Professor Caroline McMillen, Chief Scientist for South Australia

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Snapshot

Lot Fourteen: A global precinct in the heart of Adelaide city
Strategically located in the Adelaide CBD, Lot Fourteen is a global precinct focused on innovation, entrepreneurship, research, education, culture and tourism. The precinct is home to 1,000 people and hosts a wide range of innovative organisations including Cisco partner the Australian Cyber Collaboration Centre (A3C). In the next 10 years, capital and operational expenditure in Lot Fourteen is estimated to generate $3.5 billion in economic activity for South Australia. Adelaide University is co-located with Lot Fourteen and A3C and is a magnet for international students, who bring significant economic benefit to the state.

Tonsley Innovation District: Australia's most advanced high-value manufacturing precinct
Tonsley was established at the site of the Mitsubishi car assembly plant and represents one of Australia's best examples of innovation precincts at scale. The site is bookended by SA TAFE and Flinders University, and an increasing number of companies – including Cisco – have established a presence there with a number of strategic commitments including:

- Cisco Networking Academy
- Digital Health Lab
- Innovation Central Adelaide.

Line Zero – Factory of the Future in partnership with BAE Systems
Tonsley is home to Line Zero – Factory of the Future, one of Australia's most promising large-scale modern manufacturing initiatives. Line Zero – Factory of the Future is a joint venture between Flinders University and BAE Systems Maritime Australia. It will serve as an industrial-scale sandpit for manufacturers, researchers and an ecosystem of large and small firms. The facility is being fully digitised – underpinned by Cisco's advanced networking technology – creating a test bed environment for the development of innovative processes, systems, applications and products. Cisco's recently established Innovation Central Adelaide facility – located at Tonsley – will help to catalyse innovation at Line Zero and ensure the facility creates opportunities for local startups and SMEs, as well as multinationals.

Melbourne Innovation Districts: Connecting health institutions across Melbourne's north, anchored by RMIT's Health Transformation Lab
The north of central Melbourne has been turned into a world-class urban district and environment that brings together the applied health focus in City North, Parkville health precinct and RMIT's Health Transformation Lab. The area is home to 21 per cent (60,260) of all knowledge sector jobs in Melbourne and is being activated through the Melbourne Innovation Districts program – a partnership between the City of Melbourne, RMIT University and the University of Melbourne.

5. Digital Transformation: Unlocking Value and Driving Efficiencies in Universities

Why it matters

The need to transform is clear in universities, which have their underpinning business and operating models challenged by the pandemic. Universities that embrace technology can more effectively absorb these shocks, but also dynamically respond to emerging opportunities. Universities that have recently prioritised investment in digital technologies were showcased on the tour, including La Trobe University and the University of Adelaide. Digital transformation is a prerequisite for universities wanting to differentiate on student experience and engagement, drive maximum value out of the campus assets and create the sort of organisational agility that's needed to respond to future shocks.

Major themes from the study tour

- **Need to take a digital-first approach to university strategy and implementation:** Technology has evolved from an augmentation tool to driving university strategy. In many universities digital has become the core platform upon which face-to-face experiences are built. Digital technology can also act as the 'lubricant' to break down the friction between silos and support more agile, interdisciplinary teaching and learning responses to the complexities of the new world. Digital will increasingly drive campus master planning.
- **Budgets are being re-prioritised – towards digital and away from bricks and mortar:** Drastic measures will be required to fund digital programs, including potential sale of assets (46% of university leaders said their institutions would consider selling buildings or real estate to fund digital programs). Other strategies include using technology to drive campus efficiencies (such as reduced energy usage) and improving the utilisation of space.
- **The investment case for digital transformation needs to apply a broad definition of value:** Universities are no longer confining their investment cases to money saved or investment avoided. In the case of La Trobe University, the investment case also accounted for what the technology enables, including creation of new revenue streams in teaching, research partnerships and improved industry engagement. Among others, major opportunities for digital exist in virtual learning, meeting rising student expectations and delivering new offerings such as micro-credentials.

What we've heard

"Partnering with Cisco unlocks a rich world-wide network of best-practice, innovation, creativity and experience. It is fundamental to the evolving role of a modern university that researchers and teachers work closely with industry to address shared challenges. This is exactly what the new partnership will deliver, and I am delighted that our two institutions, with complementary strengths and interests, have agreed to forge stronger connections for the benefit of our respective communities."

- Professor John Dewar, Vice-Chancellor and President, La Trobe University

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Major conclusions from the study tour

The big question relating to digital transformation has moved from 'if we should do it' to 'how should we do it'?

Transformation needs to happen in the economy broadly, as well as at an institutional level. The tour concluded with a number of observations relating to digital infrastructure, the role of industry and the importance of continued collaboration between government, industry and universities. Major conclusions were:

The network is a critical enabler of transformation:

The network is the first and last line of defence for security and is becoming a platform for a broader set of objectives (such as reducing greenhouse gas emissions). The demands on the network are changing quickly, driven by the impact of the Internet of Things/ Internet of People (connecting billions of devices to networks), more sophisticated cyber attackers and the need for higher levels of visibility & control. These demands cannot be managed without networked intelligence that provides extensive automation, orchestration, network segmentation and the ability to manage and control the software versus hardware layer. La Trobe University's University City of the Future project is a demonstration of how the campus' own digital infrastructure can be leveraged to create benefits in teaching, research and industry engagement. The majority of innovation activity is centred around the role that digital technologies are playing in transforming different industry sectors. By combining advanced campus technology with innovation capability universities are helping industry to de-risk their own R&D efforts and accelerate the pace of technology adoption.

Industry partnerships will continue to be critical to the economy and also the future relevance of universities:

Collaborative effort is needed to solve Australia's most pressing challenges, including Net Zero, securing critical infrastructure, hybrid work and maximising value from economic precincts. With an industry driven approach universities can continue to maximise impact to the economy and community and also help companies to grow. The best partnerships are built on mutual dependence not just a willingness to work together. Partnerships need to be less about branding and intent and more about joint activity that creates impact.

The National Industry Innovation Network will increase the scale and diversity industry-university collaboration:

Members of the National Industry Innovation Network (NIIN) are accelerating technology development in areas that will make a significant contribution to Australia's future prosperity, security and liveability. As the NIIN network grows, so too will the scale of opportunity and impact.

References

[1] Source: La Trobe University

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